

CURRY LEAVES (*MURRAYA KOENIGII*) INCORPORATED IRON RICH CURD: PRODUCTION, PHYTOCHEMICAL, NUTRITIONAL AND PROXIMATE COMPOSITION

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ABSTRACT

Curd (Dahi) is a fermented milk product, most commonly used by Indian population. Curd is an excellent source of calcium and protein but as typical of all dairy products contains very little iron and lack of phytochemicals. The research is conducted to prepare curd with addition of different quantities of fresh curry leaves. Phytochemicals, Nutritional and Self life of the final product are analysed to assay the quality of curd. The smell, taste, body, consistency, colour and texture of the curd are acceptable at the level of 18g per liter milk. Phytochemicals, carbohydrate, Vitamin E, Vitamin A, Folic acid and Iron are increased in curry leaves incorporated curd, compared with normal curd. The storage life of curry leaves incorporated curd is 12 days at refrigerated temperature.

KEYWORDS: Curd, Curry Leaves, Phytochemicals, Sensory, Nutritional Analysis

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INTRODUCTION

Milk and dairy products are ideal food that contains all nutrients required for newborn, adults and elders. Milk is considered as a good source of proteins, fat, carbohydrates as well as vitamins, calcium and phosphorus, however, it is generally poor source for Iron (Gibson, 2011) and phytochemicals. Consumption of fermented milk products is associated with several types of human health benefits partly because of their content of lactic acid bacteria. Several experimental observations have indicated a potential effect of lactic acid bacteria against the development of colon tumors (Wollowski, 2001).

Dahi or curd is the traditional fermented milk product obtained from pasteurized or boiled milk by souring with natural microflora or by the harmless lactics or other bacterial culture. *Dahi* is popular throughout the Indian subcontinent. It is consumed either in the main course of meal, as a refreshing beverage or as dessert.

Green curry leaves (*Murraya koenigii*) are one of the most commonly used spices in India (Prakash 1990). Green curry leaves are a rich source of carotene (21,000mg), beta-carotene (7110mg), calcium (830 mg) and iron (0.93 mg) per 100 g of leaves on a fresh weight basis (Gopalan *et al.* 1996). Curry leaves are generally used in very small quantities for seasoning. Curry leaves are generally discarded from the dish while eating. Hence, the nutrition potential of curry leaves remains underutilized. It is better to promote curry leaves in an edible form where larger quantities can be incorporated in the diet. One way to increase the consumption of curry leaves is to use in curd preparation. The objective of the present study is to enrich the iron content in curd by adding curry leaves and analyze the phytochemicals, proximate and self life of the final product and compare with normal curd.

MATERIALS AND METHODS

Preparation of Curry Leaves Incorporated Curd

Curry leaves (*Murraya koenigii*) and Milk are procured from a local market (Alamathi, Chennai) and then the Curry leaves are well cleaned. 18 gram of curry leaves are taken, cut into small pieces and added to raw milk. Milk is heated at 80 to 90°C and then cooled to 22° to 25°C. Milk is filtered to remove the curry leaves. 1 to 3 % culture is inoculated and incubated at 22°-25°C for 16 to 18 hours. Finally store the packed curd at 5°C.

Experiment Design

Experiments are planned and conducted to prepare plain and iron enriched curd using fresh curry leaves. Each samples are carried out 20 replicates

Preparation of Curry Leaves Incorporated Curd

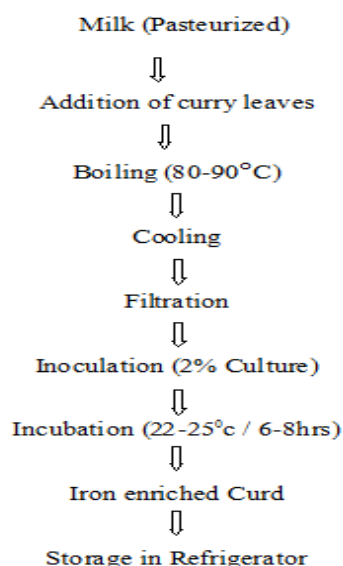


Figure 1

Physicochemical Analysis

pH: The pH was measured by digital pH meter.

Fat Content: Fat content in percentage (%) was determined by Gerber method (Pearson et al., 1976).

Protein (%), Moisture (%) and Ash (%): -Protein, Moisture and Ash contents of milk were estimated by AOAC method (1980).

Total Titratable Acidity: Total titratable acidity was measured by AOAC method (1990).

Solid Not Fat (SNF) and Total solids (%): - Solid Not Fat and Total solids were estimated by AOAC (1995).

Phytochemicals Analysis

The phytochemicals analysis of the samples are carried out to identify the constituents, using standard phytochemical methods as described by Harbone (1973); Sofowora (1993). The screening involves detection of secondary metabolites such as flavonoids, alkaloids, tannins, phenols, saponins, coumarins, steroids and terpenoids

RESULTS AND DISCUSSIONS

The data obtained from all the studied quality attributes are statistically analyzed and the results are interpreted. Table 1 and 2 showed that the acidity and pH of curry leaves incorporated curd at room and refrigerated temperature. Statistical analyses showed that there were significant ($P < 0.05$) difference within the value of different curd samples. Our reports are concurrent with the findings of Rahman [14] and Ali [15] who reported the average pH value of plain and curry leaves incorporated curd as 4.47 ± 0.45 and 4.79 ± 0.01 respectively.

Table 1: Shelf Life of Curry Leaves Incorporated Curd at Room Temperature

Storage Intervals (Days)	Acidity*	Ph Value*
0	0.82 ± 0.01	4.05 ± 0.06
1	1.05 ± 0.02	4.04 ± 0.06
2	1.20 ± 0.02	4.02 ± 0.03
3	1.29 ± 0.03	4.01 ± 0.01

Mean \pm SD

Table 2: Shelf Life of Curry Leaves Incorporated Curd at Refrigeration Temperature

Storage Intervals (Days)	Acidity*	Ph Value*
0	0.82 ± 0.02	4.05 ± 0.06
2	0.84 ± 0.01	4.04 ± 0.06
4	0.85 ± 0.02	4.04 ± 0.05
6	0.86 ± 0.02	4.02 ± 0.03
8	0.88 ± 0.01	4.02 ± 0.02
10	0.88 ± 0.03	4.00 ± 0.01
12	1.29 ± 0.01	3.99 ± 0.01

Mean \pm SD

Table 3 confirmed that the phytochemicals like flavonoids, alkaloids, tannins, phenols, saponins, coumarins, steroids and terpenoids are present in the curry leaves incorporated curd using different solvents.

Table 3: Phytochemicals Analysis of Curry Leaves Incorporated Curd

Phytochemicals	Petroleum ether	Chloroform	Alcohol	Water
Steroids	+	+	+	-
Alkaloids	+	+	-	+
Triterpenoids	+	-	+	-
Tannins	+	+	-	-
Saponins	+	-	-	-
Quinone	-	-	-	-
Coumarin	+	-	+	-
Protein	+	+	+	-
Sugar	+	-	+	-
Gum	-	-	+	-

(+) = Presence; (-) = Absence

Table 4 showed that the mean values of iron, calcium vitamin E, vitamin A, folic acid are increased in curry leaves incorporated curd compared with plain curd. Statistical analyses showed that there were no significant ($P < 0.05$) difference within the value of different curd samples

Table 4: Nutritional Analysis of Plain and Curry Leaves Incorporated Curd

Nutritional Content Per 100 Gm	Normal Curd*	Curry Leaves Incorporated Curd*
Iron (mg)	00 ± 0.01	1.027 ± 0.02
Moisture (%)	84.985 ± 0.02	84.95 ± 0.03
Carbohydrate (gm)	4.678 ± 0.03	9.01 ± 0.02

Table 4: Contd.,		
Fat (gm)	3.489±0.02	2.97±0.01
Protein (gm)	3.66±0.03	1.458±0.02
Ash (gm)	0.77±0.03	0.705±0.04
Calcium (mg)	121.04±0.02	225.01±0.03
Vitamin e (µgm)	0.031±0.01	440.018±0.02
Folic acid (µgm)	0.39±0.03	20.94±0.03
Vitamin a (iu)	99.07±0.04	119.96±0.03
Energy (kcal)	64.74±0.03	68.61±0.01

Values are Mean ± SD

CONCLUSIONS

Milk and Milk products are one of the essential parts of the daily diet of Indian population. Value addition to curd and its related products will provide plenty opportunities to food industries for increasing their products. This study shows that curry leaves incorporated curd have relatively good physicochemical and nutritional characteristics. Enriching curd with curry leaves will boost the consumers as a functional food and would alleviate many physiological disorders like anemia, night blindness etc.

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